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THE BRITISH JOURNAL
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OPHTHALMOLOGY

JUNE, 1918

COMMUNICATIONS

THE DIAGNOSIS, DISEASES, AND THERAPEUTICS OF AMETROPIA*

BY
GEORGE M. GOULD, M.D.
ATLANTIC CITY, N.J., U.S.A.

[We are unable, owing to lack of space, to publish Dr. Gould's long opening address, *in extenso*. After enumerating "some ametropic amblyopias of the world," and discussing the oculist, his office and tools, and the oculist's patients, he deals with "the art of measuring ametropia."]

"*Crude suggestions toward acquiring the art of refraction* are all that one may tell another. The so-called objective methods of measuring ametropia are of little or no value. Retinoscopy by a rare expert, for very young children is of occasional service.

First, and absolute, is the exceptionless rule that up to 45, and sometimes up to 50 years of age—largely depending upon the art and skill and experience of the oculist—there can be no accurate diagnosis of the ametropic errors without cycloplegia. My own practice is never to use atropin for this purpose; it wastes too much time for the patient; other reasons suggest themselves.

*An opening address, introducing a discussion upon Errors of Refraction, at the Oxford Ophthalmological Congress, July 1917.

I use a 10-grain solution of homatropin to the ounce, with a dash of cocain added, instilling six times a drop in each eye about every six minutes, and I find, usually, the accommodation "dead" in about 45 minutes. I have never noticed the least tendency to produce hypertension by these drops. When the tests have been made, if desirable, I instil a few drops of eserin solution to bring the pupils and accommodation wholly or partially back to normal, or to make the patient more comfortable. I lend my patients "London-smoked" spectacles to wear until the return of the pupils to normal.

The Practical Testing.—During the tests the patients must not cross the legs, nor cant the head, nor rotate it to one side. The body should be kept as near vertical as possible. These four rules are advisable because of the fact that some 80 or 90 per cent. of patients have lateral spinal curvature, and the axes of astigmatism are changed or influenced by the lack of verticality of the head and body. There are a few cautions or rules that may help one to avoid inaccuracies. For instance, no light from behind must strike the posterior surface of the lenses. If any accommodation whatever is present, never start the testings by trying any minus lens, thus making existing myopia greater, and turning low hyperopia into myopia. The mistake is because in low and even moderate hyperopic defects the minus lens sharpens vision by challenging and over-stimulating the ciliary muscle. This, once more, stresses the need of the cycloplegic. Every child is born hyperopic, but also astigmatic, because in all previous ages eyes were adapted for securing sharp vision at a distance, when near-work, reading, etc., had not yet arrived. Civilization as we know it is a very recent affair, and the hyperopic eye, unaided, cannot perform the duties suddenly thrust upon it. Hence the strain produces an enlarging of the eyeballs generally, and sooner or later comes myopia. But it comes to millions of us moderns unnecessarily and through a criminal ophthalmology which instead of preventing it multiplies and morbidizes it, by giving too early minus corrections when they should be plus ones, which increase existing slight myopias into enormous ones that minimize or kill distant objects, so that the soul is shut in a close-walled and windowless subjectivism.

Any plus lens that increases acuteness of vision in the least proves the eye is hyperopic. It is best to begin with a low power plus cylinder, fixing at once, approximately the axis. If the error is high (as shown by low acuteness) quick trials with alternating 0·25 or 0·37, spheres and cylinders, soon bring approximate normality of acuteness. Then the use of the trial 0·12 testers, spheres and cylinders, both plus and minus, soon bring the fixation of limits and accuracies.

In the progress towards this ideal one may find that 20/20 "old style," gives neither the finish of the affair nor perfect acuteness, and, *e.g.*:—

(*a*) The low astigmatism suddenly reverses the axis.

(*b*) There is amblyopia; but that may not be real, and other combinations may bring perfect acuteness.

(*c*) There may be mixed astigmatism.

(*d*) Is the amblyopia due to retinal disease, or cloudy media?

(*e*) Or to a sad history of quack spectacles.

In cases of low and genuine myopia, diagnosticated under cycloplegia, one may usually prescribe at once for patients under 40, the mydriatic estimate, if accurate, being correct for constant use.

In all hyperopic cases no prescription should be written until the normal accommodation has fully returned, in about two days, especially if eserin has been used. This is necessary because, chiefly, there may exist little, or much, or enormous hypertrophy of the ciliary muscles. This is all the more advisable with patients from 35 to 45 years old, and markedly if the life-long hyperopia has been high.

In the last condition it is plain that presbyopia really begins at 35, 38, and surely at 40, according to the amount of the precedent hyperopia. It may be necessary in such cases to order bifocal lenses. This depends on occupation, on the existence of previous ocular or systemic diseases, and sometimes on other conditions, doubts, etc. Even the expert may find himself in trouble.

As regards astigmatism, every eye has more or less, and the first proviso is that both the axes and the amount must be determined with the greatest care. The total astigmatism and the exact axes, when rigidly determined, must be ordered for constant use. I have seen cases of amblyopia in the astigmatic axes only, or in their opposite axes, and then woe will follow, for the patient and oculist, unless the thoroughgoing neutralization has been made, and the patient, even then, may have to suffer for awhile.

In truth there are many more instances of irregular astigmatism than the novice or the careless are aware of. May I ask attention to a little device which has been of daily use to me in fixing axes with precision? With the best correction possible in the trial frame, I use the bridge of the nose as a pivot of rotation of the frame, covering the excluded eye with a blinder. By see-sawing or rotating the frame 5° or 10° the eye will easily detect a change of axis of 2°, 3°, or 5°, and in many instances that little misplacing of the axes may mean unhealth and unhappiness to the sufferer.

Full correction, or not, of ametropia?—If certain of the accuracy of our diagnosis of astigmatism, both as regards amounts and axes, the full correction is always to be ordered. As to hyperopia, it is a different affair. Only the mydriatic can give us the exact

measurement of this most common defect. And yet, of course, we do not order the full amount except when presbyopia has become complete. Every patient differs from others as to the amount of the hypertrophy of the ciliary muscles that may exist in a special case. There is no other problem with greater dangers than this when we come to writing the prescription. Rules cannot be made for further guidance, and different patients. We must study the patient, his occupation, the amount of near-work demanded, etc. Age has also to be considered. With high excess of accommodation the danger must be kept in mind that too high-power lenses will, for a time at least, make the distant vision so poor that the patient will for too long a time be unable to see well. If he leaves the glasses off the abnormal excess of accommodation-power will never lessen. Sometimes, even though youthful, the patient may be compelled to wear bifocals until the over-powerful muscles lessen in strength. In all cases the accommodation must be left a certain freedom or play, but never so much as to run amok.

As to *Anisometropia*, each eye must be treated as an independent organism, and given the lens best suited to bring it and keep it in function, preserving, certainly, right-eyedness in the right-handed, and left-eyedness in the left-handed."

[Dr. Gould then deals with the question of heterophoria, insufficiency, and squint, presbyopia, and "right-eyedness and left-eyedness."]

"*Have it clearly understood by the patient*:

1. No eye, or its refraction, remains the same for over two years. Lenses must be changed, sometimes, in less than two years.

2. If relief of ocular or systemic diseases due to eyestrain has not come about, the patient must return in order to find out why, and we must closely and clearly inquire:

3. Has the patient, as promised, worn the glasses during the entire waking life?

4. Have the frames become bent or misplaced in position?

5. Have the lenses been cleaned and polished, in the manner ordered, at least six times a day?

6. Have the lenses been scratched, and their transparency dulled?

7. One patient returned several hundred miles because, in the wind, a grain of sand had flecked one lens, opposite the pupil, 1/100 of an inch in diameter.

8. Stone-cutters and other workmen often have injured lenses from flying bits of stone. A plano lens, "hook-front," is advisable in such cases.

9. If the axes of astigmatism are not 90° or 180°, a dropped-out lens may be replaced wrong side up. A professor of chemistry

was compelled to journey a thousand miles to reverse the same lens with axis of astigmatism as ordered.

10. A "stunning" ribbon, guard, or chain, on eye-glasses is really "stunning" to eyes and brain. Unless one has a nose unusually shaped for holding eye-glasses, do not allow them."

"*The ocular diseases caused by Ametropia.*—Every year of the thirty-two that I have been in practice my conviction has been deepened that ametropia is greater than all other causes, direct or secondary, of ocular diseases. . . . Except when (rarely) caused by specific infection, I think the following ocular diseases are almost always caused by ametropia:

Blepharitis, styes, conjunctivitis, pterygium, all heterophorias, strabismus, epiphora, iritis, keratitis, retinitis, glaucoma, and surely, cataract. Neutralize perfectly the ametropia, and sufficiently, and early, and late, and often, and these diseases do not appear, except in rare traumatic and toxic cases.

[Among diseases caused by eyestrain Dr. Gould includes migraine, neuritis, neurasthenia, Ménière's disease, nutritional diseases, mental diseases, despondency and suicide, lateral spinal curvature, optic neuritis, etc.]

"*Notes concerning the history of eye-strain reflexes.*—The discoverers of the truth that certain ocular and systemic diseases are caused by ametropia should be rated as among the greatest benefactors of the world. Sometime this will be, but probably not very soon. So far as I can learn, the first man who discovered the truth was Halfort. His book was published in 1845, and entitled *Entstehung, Verlauf, und Behandlung der Krankheiten der Künstler- und Gewerbetreibungen.* It is the first time that artisans (whose labour is so greatly ocular) are thus emphasized as so decidedly subject to occupational disease. The author, concerning straining of the eyes in industries, speaks of the now forgotten truth that the eyes are most delicately constructed and noble organs of the body; he emphasizes the reasons for such strain as follows:—

1. By long continuing looking at small objects, mentioning especially watchmakers, typesetters, embroiderers, lacemakers, miniature-painters, manuscript-copyists, engravers, etc.
2. Work with harsh colours, or upon highly illuminated objects.
3. Labour under poor or fluctuating illumination, such as by flickering oil or candle-lights, and even with good lights if long continued.
4. Sudden change from darkness to light.

The diseases resulting from these abuses are thus listed:—

1. Shortsightedness from work on minute objects.
2. Inflammation of the external parts of the eyes, and later of the internal parts, leading to loss of vision and cataract.

3. Visual deterioration, amaurosis, deep-seated pain of the eyes, more frequently intense headache, etc.

Spectacles and hygienic precautions are recommended to obviate the foregoing ills. The nervous irritability, etc., of yarn-spinners is emphasized. And there, forgotten or ignored, this wise old observer is left!

I think this discovery one of the most remarkable in the history of medicine. But, as always, it was long in advance of the time possible for acceptance, and so the great discoverer had to die without a single person in the world crying him *Amen*. That's the way with medical men—one to discover and all the rest to ignore, perhaps to curse. In 1867 Dr. Green, of St. Louis, wrote that astigmatism was an active cause of myopia.

Then in 1874-1875-1876, Dr. S. Weir Mitchell, of Philadelphia, published three articles. Halfort had been forgotten, of course, or ignored. Mitchell's reports were based upon those of the contemporary oculists, Drs. Thomson and Norris, of eight cases of headache, migraine, giddiness, etc., which were at once cured by glasses. To these two men, therefore, the honour belongs rather than to Mitchell. But, as before, there was again a silence which seemed destined to endure forever. The rest-cure was invented, but of all unholy things it may not be endowed with eternal life. The planned silence, with the necessary forgetting, and all the rest-cures in the world, could not keep the truth from re-emerging, and from 1885 there began a series of witnessings to the fact ever growing in frequency and power, and the number of oculists and physicians and patients who in no wise will be snuffed out or sneered down for ever.

In 1882 Dr. G. C. Savage published an article in which he reported cases of sick headache cured by hypermetropic and astigmatic glasses.

In 1888, Dr. E. G. Martin, a French oculist, published his sound and brave article on the subject. Up to that time it was the best and most complete demonstration that the whole migrainic symptom-complex is caused by eye-strain. But, again, no oculist or physician ever gave him a word of recognition. Schmidt-Rimpler scorned Martin's contribution and theory with genuine unscience. But by this time others were welcoming the truth which was fast passing into recognition after the usual and necessary condemnations and silences of forty or more years."

(Under the heading *Ametropia and Psychology* Dr. Gould writes:—)

If we class astigmatisms with the two spherical defects, we have two great ocular abnormalisms remaining—hyperopia and myopia, or colloquially farsight and nearsight, and the median, emmetropia.

But the perfect or ideal eye of emmetropia, in a strict sense, is almost unknown. I have never seen a pair of emmetropic eyes. In some few the defect is indeed slight, but never inconsiderable. The great majority of eyes are hyperopic, but are practically worsened by more or less astigmatism.

The moderately hyperopic pair of eyes is therefore manifestly the better instrument for rightly seeing and knowing the world in which we live. The man or nation having a low degree of hyperopia, and combined with the least astigmatism, will come nearer seeing the world as it is, and he will in general have the most accurately functioning mind. Other things equal, he will make fewer blunders, spiritually be more efficient, and better serve humanity and civilization whose glad servants we should all be. This low degree of hyperopia has furthermore an innate power of "accommodation," as it has been called, which, for common visual purposes, makes it functionally even better than the most rare emmetropic eyes. Consequently, its range of approximately accurate vision is the nearest perfect that is possible. Therefore, that people, especially its educated and ruling classes, the majority of whose eyes are slightly or moderately hyperopic, are the best seers and knowers of the world, i.e., they have the best minds ethically and intellectually wherewith to lead in civilization. And they will see and know the beautiful and lovely in that world better than the more ametropic nations.

Thus the two most numerous and dominating errors of refraction will roughly differentiate and govern the direction of development of national types of character. That is, a nation will roughly tend toward far-sightedness, ocularly and mentally, or toward ocular and mental near-sightedness. The excellencies and faults of the visual organs will in time and in proportion to their relative prevalence direct national habits, energies, developments, efficiencies and deficiencies, in certain directions and to successes or failures of peace, or to tragedies of war.

* * *

Visually, emmetropia is the grey half-way between day and night, with not too much or too little of effort, or of want, or of satiety. And few there are that reach that island of dreams!

If impossibly it should be the rule of a nation, it would develop fairly well-rounded minds, good folk, but occasionally with a dip towards good-for-nothingness; somewhat indolent of will, philosophic, self-contented; moderately well-to-do and successful, with a kind of sleepy science; literary, but not overmuch so, mildly poetic, in blank verse, but preferring a monotonous and lethargic prose, somewhat, for instance, after the manner of Pater. It would keep out of war, or try to do so, because it would be governed by lukewarm and self-respecting emotions and foresight.

A nation of moderate hyperopes would be the best visualizers in

the world, capable always of easy and accurate far-sight, but when wishful or from necessity with "accommodation," capable of as clear and perfect vision of the near thing as is desirable. It commands the healthiest eyes, and the most accurate and most enduring vision. But best of all it images the world of fact the nearest perfectly of any visual mechanism. And the perfect glasses of the hyperope (which he can and usually would get) do not change or depreciate the appearance of the actualities of the world nor morbidize the mind by distorting or magnifying or belittleing the retinal pictures or their ontologic storehouse—the mind. The moderately hyperopic eye is that first of the American, with the English as a close second.

In myopia, real or only apparent, the greatest ophthalmologic sin is to omit the mydriatic in making the tests. This is because without the cycloplegic the ametropia often simulates myopia in low hyperopic defects, and it is endless injury to order low myopic lenses for such patients, when low hyperopic lenses are needed. Such treatment is, as a rule, common in certain countries, and whole peoples may thus be made artificially and increasingly myopic. Especially in the educated and ruling classes as high a proportion of myopics as 60 per cent. has been demonstrated in university undergraduates.

What now is the mental peculiarity and result of persistent use of myopic eyes? It is simply that the distant thing is by them not seen at all, or is minimized beyond all clear seeing and actional relation to reality. The myope looks as if through a reversed opera glass, or field glass, and he naturally finds himself seemingly the largest thing in the world. Hence a sort of mental thaumaturgy that creates self-esteem, egotism, and self-will, ending, perhaps, in some dogmatism and tyranny. All of which may be caused or enormously exaggerated by ignoring astigmatism, and the use of spectacles that turn low hyperopias into myopia, and that soon enormously increase the unnecessary degree of myopia. This deprivation of ocular farsightedness would naturally be increased if the great majority of educated and ruling minds should become myopic. In such a supposed case it would be natural and inevitable that whether in statesmanship or war, in ethics or religion, in literature, or science, they would teach and rule, somewhat tyrannically and harshly. Would they not abjure the humanistic side of learning and "go in" for materialistic science? They would, we may suppose, become slightly dictatorial, seeing themselves giants, their enemies small and contemptible. There would be a slight exaggeration of egotism and a little danger of delight in power. They would also be infinitely capable in meticulous accuracies, things microscopical and chemical, but bunglers, I fear, in far-off visions and truths,—dead, indeed, spiritually and religiously."

ERRORS OF REFRACTION*

BY

R. H. ELLIOT,

LIEUT.-COL. I.M.S. (Retd.)

LONDON

I DESIRE to start my opening address by thanking you for the great compliment which your Council has paid me by inviting me to deliver it. I am very conscious of the responsibilities it involves, and it has seemed to me, after careful thought, that I can best serve the interests of this Congress not so much by putting forward views of my own, as by indicating the broad lines along which I think that discussion can most profitably be indulged in.

I should like, first, to point out that the subject chosen for to-day is one in which every ophthalmologist has an interest, and on which every ophthalmologist can claim to be an expert. There are many branches of our science, the practice of which is confined to a comparatively small number of men. This is not so with refraction. It is the mainstay of our practice, both professionally and financially. The general public judge our capacities more by our success in this line than by anything else. This is only natural, since it furnishes them with such a ready standard. Moreover, the subject is very far from being one that has been well thrashed out. It teems with points of burning interest. There is much for everyone of us to learn, and let us not forget in a discussion like this that we may learn it when and where we least expect.

At the very outset of the discussion there is one point which should be made quite clear, viz., that the methods which suit one man's practice may be quite unfitted for that of another. The surgeon who has to examine a large number of school children in a limited time, or he who must finish off a room full of out-patients before he leaves for the day, will be bound to employ different methods from those of a consultant who has ample leisure for his practice, and who is suitably remunerated for his labour. There is nothing in this statement to infringe the highest standard of ethics. Each man in his work must aim at doing the greatest good to the greatest number of those who intrust the care of their health to him. Were the out-patient surgeon to follow the leisurely methods of the consultant, a very large number of his patients would perforce be deprived of his services. On the other hand, were the consultant to treat his patients on the lines of the out-patient room, he would certainly not be a financial success; nor can one think that such action could be justified on any possible grounds. This is a very important matter, and one, which, it is suggested, speakers should keep constantly before them.

* An opening address, introducing a discussion upon Errors of Refraction, at the Oxford Ophthalmological Congress, July, 1917.

There is another preliminary point I should like to bring forward. The discussions at the Oxford Congress have often been among the most interesting one has listened to, for the simple reason that they have shown a freedom from restraint and a disregard for criticism which are often absent from the debates of more formal societies. Men do not feel that every word they are saying is going to be recorded in print, and they also display a confidence in the charity and tolerance of their audience, which has, I believe, been well justified in the past. I hope that this discussion will be no exception and that the speakers will venture boldly to tell us what they actually do in their practice, and not what they would like to do, or what they would like others to think they do. If this is the tone of the discussion, we shall get down to bed-rock, and our Session will be a most fruitful one. May I now suggest a few of the leading points round which discussion might, in my opinion, gather ?

The use of cycloplegics. It is important to distinguish between cycloplegic and mydriatic drugs, the more so because, though the terms are not synonymous, they are often used as if they were by writers, who really know better. Up to what age should we employ atropin ? and from what age onward may we safely use homatropin with the confident security that it will effect our purpose ? Should cycloplegia be obtained in *all* cases before fitting a patient with spectacles, and if not, where are we to draw the line ? I cannot help thinking that this should make one of the most interesting subjects for discussion. There are those who will urge that cycloplegia often involves a needless expenditure of time and energy on the part of the surgeon, and of fees on that of the patient. There are others who will contend that a refraction estimated without cycloplegia is of very doubtful value in a material percentage of cases, and that it is not always possible to pick the cases beforehand. Some, no doubt, have tried both methods and compared them. It would be interesting to hear their results. I have taken a little trouble to do this myself, and my personal experience has been, that whilst in a certain number of cases the astigmatism recorded is the same with and without cycloplegia, there are important, and by no means infrequent exceptions to this rule. I would ask: Is the method without cycloplegics sufficiently reliable to justify its continuance, and, if so, within what limits ?

Spasm of the accommodation. Is this frequently met with ? or is it a rare condition ? Are we to distinguish between it and " a state of permanent excessive tonus of the ciliary muscle, which is directly prejudicial to vision ? " Is the latter condition a common one ? and how are we to distinguish it from the former ?

We all meet with cases, especially in the hyperopic, in which a

tonic ciliary spasm leads a patient to prefer the addition of a minus sphere to his correction, as soon as the muscle has regained its tone, after the passing away of cycloplegia. Perhaps this condition is most frequently met with in eyes with mixed astigmatism. If after a reasonable trial with theoretically correct glasses, the patient is still uncomfortable, and still demands the addition of minus spheres to his spectacles, are we acting wrongly if we accede to his wishes? It may be unorthodox to say so, but I think there are times when this is the right procedure. What do the members of the Congress think?

May an anomalous contraction of the ciliary muscle alter the meridional strength of a lens and thereby compensate for an astigmatism, which is due to a defect in some of the other media of the eyes, especially the cornea?

This subject has been long debated, and it could not fail to be of interest if the members of this Congress would devote some of their attention to it during the discussion. We are all aware that the refractive correction indicated by a retinoscopy under a cycloplegic may not be tolerated by the patient once the accommodator muscle has returned to full action, and this sometimes in spite of the fact that whilst accommodation was still paralysed, the correction was well borne. I am excluding for the moment the cases of hyperopia with spasm of the ciliary muscle in which the addition of a concave sphere to the indicated cylinder suffices to bring vision up to the full standard. It is to be borne in mind, in considering these cases, that all cycloplegics are mydriatics and that the refraction of the media in the visual axis of a contracted pupil is by no means necessarily the same as that over the whole field of a dilated pupil. We know this from the scissor movement seen in the shadow test, and we also have abundant evidence of it when using the astigmometer. This, however, will not cover a class of case with which, I have no doubt, many of us here are familiar. I personally have kept accurate records of the notes of my refraction cases for well over twenty years, and amongst them I can refer to patients who when they were young found no advantage from the use of a cylinder, *though cycloplegic retinoscopy indicated its application.* As years went on and the activity of the accommodator muscle lessened, generally about the time of advent of presbyopia, they were glad to accept the erstwhile refused cylinder. This squares with the widely accepted experience that about the time presbyopia begins to give trouble, patients are glad to accept an astigmatic correction which they did not want before. My notes show that in some cases at least this has not been due to the development of an astigmatism, but to the manifestation of one which has hitherto lain latent. I frequently met, in my Indian practice, with Europeans who, after a long term of service in the country, or after

parturition or some debilitating illness, came to me for the relief of a premature presbyopia, associated with slight astigmatism ; such patients gladly availed themselves of the help conferred by correction of the refractive error, even though it might be a low one. When they went back on furlough to Europe they soon found they could discard spectacles, but they took to them again when they had been back in the plains for a hot season or two. The relation between the tone of the muscles and the trouble given by these low errors in refraction is well seen in many of the young fellows we have to treat for wounds nowadays ; their need for glasses is a signal of their impaired bodily tone, and passes away as soon as they get really fit again.

These considerations lead us naturally to the discussion of an allied topic : Do the physical changes which manifest themselves in astigmatism ever really *develop* as life advances ? I put aside traumatic cases and those in which there is a pathological yielding of the coats of the globe ? The subject is full of interest, practical as well as theoretical, but it is not possible for me to follow it further now.

Arising out of what has gone before, I would suggest another question for your consideration : In the great majority of our cases, we can perform a retinoscopy with a confidence that the patient will accept our estimate to a quarter diopter or less. On the other hand, we all meet from time to time with cases in which our valuation of the error fails us miserably. How is this to be explained ? The answer is neither single or simple, and I hope those present will help to elucidate this very practical problem.

I have the record of a patient who came to me with asthenopia. I found he had 2·5 D. of astigmatism, but after cycloplegia had passed away, he found no benefit from any higher correction than one of 1·0 D. I gave him this and waited ; after some months I was able to increase it slightly. This was done on two subsequent occasions. Finally, he wrote to me that he would like to take the full correction ; he did so successfully. I believe that the patient wore down the irregular action of his ciliary muscle, and so exposed the full measure of his astigmatism, which till then was concealed by a meridional tonic contraction of the muscle. The other possibility that suggests itself is the compensative pressure of the lids. During an astigmometric examination, one may see the astigmatism in a young eye vary by from one to several diopters, according to the state of closure or opening of the lids, but I doubt whether this will explain my case and others, for the alterations one sees under the astigmometer are so frequent and so transitory that they would not be likely to hold the vision at one steady level as happened in these cases.

The use of low-power spheres and cylinders. The last few years

have seen the introduction of low-power spheres and cylinders. I refer to the one-eighth diopter glasses. Most of us have given these a good trial, and there will undoubtedly be different opinions as to the value of this innovation. It has always to be carefully remembered that there is an element of faith-healing at the bottom of the success attained by most therapeutic measures. Few if any of the means at our disposal can vie with the fitting of glasses in this respect. The Indian native practitioner relies much on "jadu" or magic to compel the confidence of his patients. We smile at him, but do we not often unconsciously do the same? It is the more highly strung of our patients who feel most severely the lower grades of errors in refraction, and it is precisely such people who are most influenced by suggestion. I wish to be clearly understood that I am not attacking the practice of using low cylinders, and that I am wholly and unreservedly in favour of making the most accurate correction that it is possible to make in each refraction case that comes before us. One sometimes hears the practice of fitting to an eighth of a diopter ridiculed as pernickety faddism. Let me employ a simile to rebut this suggestion. If we ask a patient to lift a five pound weight and to put it on the table, he will do so without conscious effort, but if we should ask him to carry that weight for the whole of a working day, he would become very tired of it. Similarly, I would suggest that whilst a small refinement in correction does not appear of much value before the test types, the summated saving of strain throughout a working day may prove of great value to a highly strung patient. Incidentally, I would remark that it is sometimes the custom to look down on these people, who are spoken of as neurotic or neurasthenic, and I would protest against such criticism. I think that the world's best work is done by nervous men and women. Its poets, its painters, its thinkers, not a few of its great soldiers and sailors, its distinguished men of science, and to fall to an appreciably lower level, its great lawyers and politicians are very often of this type. We cannot, therefore, afford to neglect them in our calculations. At the same time I would not be understood to be advocating the indiscriminate use of low-power glasses. There is, however, another side to the question. There are surgeons who hold that Grandpa's spectacles are the best possible for his descendants, and who spend their time in throwing the elaborately calculated products of other surgeons' work into a glorified waste-spectacle basket. I would not dispute that they do good to a certain number of patients who have been made the victims of faddisms; but I think that in this, as in everything else, the best motto is *in medio tutissimus ibis*—reason, judgment and sane balance are here, as elsewhere, the surgeon's salvation. The subject is one on which we should hear many interesting opinions.

The resemblances in the defects in refraction found in parents and their offspring, and in siblings.

I have been greatly struck by the resemblances between the refractive errors found in the eyes of members of the same family; so much so, that whenever later members of a family come to me, I always look up the records of the earlier ones. Not only is the nature of the defect (e.g., compound hyperopic or myopic astigmatism, etc.), often the same, but the degree and the axis of the astigmatism show remarkable resemblances. What is still more interesting is that the nature of the defects in muscular balance (heterophoria and hyperphoria) often show a close similarity. It is quite clear that the tendency to the defects is inherited. I hope that others will be able to support me in this. I am confident that any of those who keep careful records will do so if they will look through their case sheets with this point before them.

The treatment of myopia in the young should prove an attractive and highly debatable subject. I commend it to your notice.

The routine method adopted in refraction.—Here again we find the greatest variety. There are surgeons who contend that it is quite unnecessary to see a patient after the visit under cycloplegia. There are others, who believe, and in the majority of cases I agree with them, that a final examination should invariably be made after the eyes have returned to their normal condition again. The environment of the surgeon and of his patient are important factors in the decision. Moreover, different classes of cases must be dealt with on different lines. There is room for the expression of many opinions.

Tests for Heterophoria.—It will be interesting to learn how many surgeons make a routine practice of testing for disturbances of the muscular equilibrium of the eyes both in the lateral and in the vertical sense. We all see each other's failures, and my own experience is that a very large proportion of the patients who come to me because they have been elsewhere without relief, are suffering from some form of heterophoria. In this connection it would be interesting to learn the experience of members of the correction, not only of the hyperphorias, but also of the exophorias and esophorias. One more question in this connection. How many surgeons make a routine practice of testing the muscular balance at the reading distance as well as at 6m? I raise this question as I think it is one of great importance. The extraordinary discrepancies between the two sets of readings in the vertical as well as in the lateral meridian would of itself open up a large field for discussion. Lastly, what instruments do members prefer for such near vision tests?

Instrumentation in the estimation of refraction.—I think that it will be admitted as a rule that the more complete and exhaustive we make our examination of a patient, the less likely are we to

overlook important elements in his case. If we desire to make our examination thorough, I do not think we can afford to dispense with the assistance of the modern improvements in instrumentation. The great objections one hears made to such instruments are (1) their initial cost, (2) the difficulty of their upkeep, and (3) that the results obtained from them are not of sufficient value to compensate the surgeon for the expense and trouble involved. In order to provoke discussion on the subject, I shall so far depart from the rule I have laid down, as to draw in some measure on my own personal experience in these matters.

(*a*) In the estimation of refraction a vast amount of time is saved by the use of one of the very beautiful modern ***refractometers.*** It takes but a fraction of a second to change one glass for the next, to the great advantage alike of the surgeon and of his patient, for it saves the former's time, whilst it gives the latter the greatest possible facility in distinguishing between two glasses which are nearly alike. In retinoscopy, too, the advantage of being able to go backward and forward rapidly over a range of glasses needs only to be tried to be appreciated.

(*b*) ***Retinoscopes.***—It is a good many years since Hugo Wolff brought out his electric retinoscope with a single line of light, and developed its ***technique*** in a monograph of truly Teutonic thoroughness, and yet his instrument is still almost unknown in Great Britain. I have used it now certainly for more than a decade, and I should indeed feel lost without it, so much so that I have tried to get an English instrument made on similar lines, nor should I have the slightest scruple in pirating his ideas for the service of British ophthalmologists. To my mind, the advantages of the instrument cry aloud for recognition.

(*c*) ***Astigmometers.***—I have often heard surgeons assert that these instruments are useless. May I speak from over twenty years' experience of them? I began with the crude apparatus whose mires were lit with daylight, and have worked up, steadily "scrapping" each older model as a better came out, to the beautiful instruments of the present day, ***none*** of which to my mind is superior, if any indeed is equal, to the Meyrowitz astigmometer. The uses of an astigmometer, as they appear to me, are as follows: (1) The instrument will often give the exact axis of the astigmatism. (2) When the axis of greatest and least astigmatism are not at right angles with each other, it will point out the discrepancy and give both readings. (3) Though it only measures the corneal astigmatism, and though a correction has almost invariably to be made to its readings, it furnishes valuable data in a large number or cases. (4) In asthenopic patients, with low astigmatism against the rule, it will point out the defect unerringly, and indicate the need for a cycloplegic retinoscopy, even though the

vision is fully normal. (5) In cases of high hyperopic and myopic astigmatism, which present great difficulties for satisfactory retinoscopy, its indications prove more than valuable in a large number of instances. (6) In cases with deep medial opacities, sufficiently dense to make retinoscopy unsatisfactory, the correction of the corneal astigmatism, made by the aid of the astigmometer, may prove of much use. (7) In the routine examination of presbyopes, before prescribing a reading correction, astigmometry shortens the examination and adds precision to it. (8) In children, restless patients, and imbeciles, it sometimes proves a valuable auxiliary to, or even a substitute for, retinoscopy. (9) As a means of ascertaining whether any surgical procedure or corneal affection alters the corneal astigmatism, it is unrivalled. Incidentally, its use in this connection sometimes furnishes information of great interest. May I cite one example? The corneal astigmatism, found after cataract extraction as shown by the astigmometer, is markedly in excess of the total astigmatism present. There is, therefore, a compensatory factor in action, and this, I think, is to be sought at the anterior surface of the vitreous. I am not aware that this observation has ever been put on record, but any of you can confirm it for yourselves. (10) It will unerringly and immediately show the presence of slight nebulae of the cornea, irregular corneal astigmatism, disparities between the curvature of one and another part of the cornea, such as produce scissor movements in retinoscopy, and the existence of conical cornea.

I want to make it clear that, after twenty years of use of the instrument, I would make no extravagant claims for it. To my mind, it will never replace retinoscopy, for it measures a part only of the astigmatism, and that too a variable part. What I do claim for it is that it is a valuable instrument, which gives the ophthalmologist important indications which I do not think he can obtain as rapidly or as well by any other means. Please note carefully that I do not say that he cannot obtain them at all. I have chosen my words carefully. Were I to lose the assistance of an astigmometer to-day my work would be poorer, and I should constantly feel the loss of a henchman whose services I both value and trust. The crucial objective test in the hands of the refractionist is retinoscopy; the final arbitrament is the subjective test with the test-type, but I at least could not afford to dispense with other and valuable aids such as those which this instrument affords.

It could not fail to be of interest if those who have used this instrument would give their experience of it, and especially of its limitations and of its value. It would also be most important if we could hear of anyone, who after giving it a full trial, say for a year, or over a series of 1,000 cases, has then given it up. I have never come across any such myself. Those I have met who have

objections to the instrument, either have never used it, or else have confessed they have not succeeded in mastering it. The latter accomplishment is easily acquired even by students, and is within easy reach of any trained ophthalmologist.

The *Corneal Microscope.*—It may seem to some superfluous to press the claims of so proved and beautiful an instrument as Czapski's corneal microscope, as made by Zeiss; but I have met with instances, both in private consulting rooms and also in large hospitals, in which this instrument has been allowed to fall into complete disuse, on account of the alleged difficulties in obtaining sufficient illumination from its lamp. The difficulties are in reality easily overcome, and the instrument can be arranged to stand ready for use at a moment's notice. There are, I believe, a number of these instruments lying idle in Great Britain at the present time. The view a good corneal microscope gives of the details of a corneal opacity, of iris changes and of superficial, and even sometimes of deep, opacities in the lens, has only to be seen to be appreciated. The expense of a corneal microscope is not prohibitive; the working is really quite simple, and the use is a luxury to the clinical observer who wishes to learn a little more than can be revealed by the ordinary methods. It may be suggested that this form of microscopy has no direct relation with refraction work. To this I would reply, that if one desires to avoid overlooking important points in a case, each patient must be examined by a routine method, and that if we are at all in doubt as to the cause of a difficulty in bringing a patient up to the visual power which we should expect to reach, it is of importance to have at our disposal the best possible means of obtaining full information as to the condition present. Do not misunderstand me to mean that every case that comes for refraction requires examination under a corneal microscope. My point is that wherever the least doubt exists, the cornea, the iris, and the front of the lens should be carefully looked at by oblique illumination, and this be followed up, if necessary, by a more elaborate examination.

One could easily speak in the same strain of many other of the modern devices for full examination of the eye. The objections that they cost money, that they take time to use, that in many cases they are unnecessary, and so on, do not require to be answered. To any thoughtful mind they will answer themselves. It is sometimes claimed that one surgeon, whose instruments are few and antiquated, will do as good or better work than another with every modern appliance at his disposal. I would submit that this is not the point. We each of us desire to do the best work that is in our power, and it is for each of us to decide how that can be done. We would not equip our navies or our armies for a strife like that which is raging at the present time with anything but the best weapons,

and our Government adopts the maxim to try all things and hold fast that which is good. The plea that I am urging to-day is that the members of this Congress, and especially the younger members, should give the newer instruments a full and patient trial in their practice. It is the younger men who have time to do this, and it is they, too, who will find the least difficulty in adapting themselves to new conditions. One point more I would urge upon them. More elaborate methods of examination open up a field for research in the course of their daily clinical duties, and thus give a zest and an interest to their work, which is otherwise inclined to become humdrum and mechanical. I would specially press the need of cultivating the spirit of research on the younger ophthalmologists, "For the soul is dead that sleepeth," is as true of science as it is of spirituality.

I do not venture to criticise, and much less to condemn, those who do not agree with me as to the value of the appliances I am advocating. What I do urge is, that each one should get from himself the best that is in him, and in so doing, should do the best for those towards whom his royal motto is that of our Prince, "I serve." Kipling, with one of those touches of insight that will for ever endear him to his readers, has crystallized our aims for us in two lines:

> "But each for the joy of the working, and each, in his separate star,
> Shall paint the Thing as he sees It for the God of Things as They Are."

In conclusion, permit me to offer one last plea. We are discussing to-day a subject in which all of us take a keen interest; a subject, in which the lines of cleavage of opinion are wide and bold; a subject, on which many of us feel very strongly. Let us remember the possibility that despite our convictions, we may not be wholly in the right, that there are many sides to look at the question from, that others are as honest of purpose and as earnest for truth as we are ourselves, and that we may all of us make mistakes, even the oldest of us. Nothing will be more profitable and nothing will do more good, than that we should speak out our mind, and give our experience fully and freely, but let us do so throughout with that courtesy and consideration, which has always added to the charm of these Oxford meetings, and which is the best guarantee for that highest aim of our Congress the increase and the widening of the knowledge of all its members.

DISCUSSION ON THE CORRECTION OF ERRORS OF REFRACTION*

BY

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A DISCUSSION on this subject naturally divides itself into two main parts:

(1) What errors should be corrected?

(2) How should they be corrected?

We cannot deal with number two, which is treatment, until we have settled number one.

There are perhaps few, if any, living who belong to the "old school," which taught that no astigmatism under 1D. need be corrected; that cycloplegics were hardly ever necessary in refraction work; that refractions were almost best left to the optician; and that the work was rather undignified.

But still a large number of ophthalmologists in this country have not yet grasped the immense importance of careful refraction work, and if this Congress by a majority settles once for all the proper answer to the above questions, it will confer a great benefit on the profession, and cause us heartily to congratulate the Council who have chosen the subject.

We will now discuss the first question, which is, "What errors of refraction should be corrected?"—or, better, "When should errors of refraction be corrected?"

Nature starts every living organism with a "push," an amount of nerve energy or "Vril," which is calculated to enable the organism to reach maturity, and then reproduce its species, at which point Nature has finished with it. This act of reproduction often in the lower organisms uses up all the remaining nerve energy. The spider lays her eggs and dies, the flower seeds and dies; but in man there is a higher purpose intended, and consequently it behoves us to prevent as much waste of this "Vril" as possible. We do not know if lost energy can ever be replaced in the true sense, but we *do* know that its waste can be prevented. Crile, amongst others, has shown the different channels by which waste may occur, but it was Gould who pointed out years ago that one of the commonest, and often perhaps the least suspected, source of waste was eyestrain.

We cannot praise too highly the teachings of this great pioneer, who with Donders, will always stand as an enormous benefactor of mankind. Labelled at first as a lunatic, derided and lampooned, accepted only by a very few (I am proud to have been amongst that number from the first), he is at last coming into his own.

*An opening address, introducing a discussion upon Errors of Refraction, at the Oxford Ophthalmological Congress, July, 1917.

Now, what did Gould principally point out? That the individual whose vision was above suspicion might be the first to be suspected.

Gould, in his "Biographic Clinics," refers, amongst other highly interesting points, to the possibility that such men as Darwin and Huxley died before their time because they had wasted their nerve energy through the eyes. Darwin obtained relief from his dyspepsia by lying down and closing his eyes, and Huxley took long walks by night over the moors. Both of them had small errors of refraction that were not suspected to exist, and obtained relief by not using their eyes.

It will be interesting to hear from those of you who have studied the subject, what your experience is with regard to the existence of absolutely normal refraction.

I recently tabulated the results of 5,000 refractions, and I found only *nine* emmetropic, and probably with a little more care I could have eliminated these nine!

Assuming that no eye is absolutely normal, i.e., emmetropic, and that a minute error is always present, and knowing that the craving for distinct and single vision is ever present, impulses passing from the brain to the ciliary muscles to procure distinct vision, and to the external muscles of the eye for parallelism; a certain amount of nerve energy must be used up in the daily wakeful life of all individuals. This, when it exists alone, as in the healthy individual leading more or less an outdoor life, is negligible, as it forms such a small fraction of the whole available amount; but when we come to those who have lost, perhaps half, or even more of their life energy, this drain is at once apparent, and Dr. Harwood, at the King George Hospital, has shown that the bandaging up of one or both eyes produces an immediate improvement in these patients, and, following this line of treatment, the exact correction of the ocular error with glasses has the same beneficial effect.

It may be asked, if emmetropia and parallelism of the eyes are so rare, why should not everyone wear glasses? As the drain is so insidious, perhaps, theoretically, they should, but the annoyance caused to the individual by this treatment would negative the good, and the remedy would be worse than the disease; but, when the error leads to nerve waste which is too large a proportion of the available energy, then it ought to be corrected.

Let me take a simple example: We find a child of twelve years of age with 3 D. of simple hypermetropia in each eye, there is 11 or 12 D. of accommodative power, and there is no squint. He will not harm much if we prescribe *no* glasses; but take him at twenty-five years old with the same error, his accommodative power is then reduced to 7 D.; the error then is almost one-half of his total power, whereas at twelve, it was only a quarter. We know that at twenty-five he will have distinct manifestations of eyestrain and the error

must be corrected. So much for the individual at different times. Now take the individual at about the same time and under different conditions. A young man with a small amount of astigmatism or anisometropia, or both, lives an outdoor life, hunting, golfing, etc., no symptoms and no necessity to wear glasses. The same man a few months later returns from the war having suffered from wounds and shell-shock. He will have lost a very large amount of nerve energy, and the waste through eyestrain—which originally was negligible—must be arrested, because it forms such a much larger proportion of the whole.

We have seen in this war the enormous benefit that can be obtained by correcting even 0·12 D. of astigmatism, or 0·25 of anisometropia in "war neurasthenics" and those suffering from shell-shock. It is well known that shock of any kind leads to loss of nerve energy. Witness the well-known saying, that when an individual has been in an accident, collision, or undergone a serious operation, "he will never be the same man again." "Virtue" has left him never to return. When the shock is combined with loss of blood, previous fatigue and anxiety, we can easily see that it would be difficult to get a worse example. *Rest* is the treatment indicated in these cases, and yet, as soon as he is able to do so, the soldier starts reading, reading more, perhaps, than he ever did before, and this very rest he should have is prevented by eyestrain.

This then, gentlemen, is the first matter for you to discuss. Do you agree with my statement that all errors of refraction, even the smallest, should be corrected *if symptoms are present*? When I refer to small errors, I imply that small errors of anisometropia are as important as small errors of astigmatism. Do you agree to this?

It will be interesting to hear from those of you who have been treating "war neurasthenics" what your experience has been.

The next question is: What symptoms are we to look for?

Every physician now knows that he should not attempt to treat a *headache* before eliminating the influence of the eyes; but if a headache, why not any other form of reflex irritation or nerve waste?

Only a few realize the countless functional disorders that owe their existence entirely, or mainly, to eyestrain. Such up-to-date men, when they see a patient where no organic lesion can be discovered, insist upon a careful examination of the eyes, and a correction of the error when discovered, and if eyestrain is not the *sole* cause of the trouble, it often is a *chief* cause, and when removed enables the further treatment to be successful.

Will you tell us your experience with reference to the importance from the eyestrain point of view of large errors and small errors. My experience has been that large errors "take care of themselves," as it were, the patient seeking the oculist, or perhaps the optician, because of faulty vision, and not seeking the physician because of

some obscure symptom. I do not think that a large error imperfectly corrected (thus leaving a small amount for the patient himself to correct), is worse than *no* correction at all. I do not think a large error *uncorrected* is so productive of symptoms of eyestrain as a small error, but others may differ from this opinion.

I expect we shall all agree that it is more important to correct an error when hypermetropia is present than in the case of myopia. This was pointed out by Donders sixty years ago!

In answering this question we must not forget that small errors are much more *numerous* than large errors.

Recently on tabulating the results of 500 consecutive refractions giving 1,000 eyes, I found:—

866 eyes had *astigmatism*, of these:—

under 0·5	0·12	=	164	542
	0·25	=	306	
	0·37	=	72	
0·5 and under 1	0 ·5	=	108	192
	0·62	=	14	
	0·75	=	70	
1 D. and over	-	-	-	132
				866

2.—Treatment.

Correct treatment can only be given if a correct diagnosis is made:—

Cycloplegics.—A discussion on this important subject ought to yield valuable material.

We have not, I consider, a satisfactory cycloplegic. We should like one that is not a mydriatic, that is thoroughly efficient, *i.e.*, a perfect paralyser of the ciliary muscle, and one the effects of which *soon* disappear.

The inconvenience of atropin is so great that it is impossible to employ it, generally, for adults. Homatropin is the best substitute if used in a definite dose, such as Burroughs, Wellcome and Co.'s tabloid "W" ($\frac{1}{30}$ grain each of hydrochlor. of cocain and homatropin). I find it quite efficient when the ciliary muscle is not too powerful, as in myopia; but in high hypermetropia, when the muscle is often hypertrophied, it is very often insufficient, and yet, these are the very cases where we dare not use atropin in older patients, even if the patient could put up with the inconvenience. My plan has been to use atropin up to 20 years, and homatropin between 20 and 40 years. But one has often to depart from this rule, using homatropin, say, for a schoolboy of 18, up for the day,

and using atropin for patients of 24 or 25 when the error is apparently very small and the ciliary muscle very powerful.

We may hear from some here who have successfully experimented with some other and better cycloplegic. My experience has been that with the exception of atropin and homatropin, most of the ***mydriatics*** are poor ***cycloplegics***. Some have gone so far as to say that cycloplegics are rarely necessary in adult life. Personally, I have found that there ***are a few*** patients where the cycloplegic does not reveal anything new, but the large majority do; and I feel that it is better to put a few to inconvenience rather than make a wrong diagnosis in the many. I invite your remarks on this all-important subject.

Instruments for measuring astigmatism.—Called by various names, ophthalmometer, astigmometer, and keratometer, they are many in number, and although I have experimented with most, the only one I have found reliable is the one I use at present, viz., the latest model of Meyrowitz's ophthalmometer. Once the individual characteristics of this instrument and the proper working have been mastered, it certainly is wonderfully accurate. I find now at the most 2 per cent. (in the last 1,000 refractions I tabulated I found the ophthalmometer tallied with the clinical examination in 982), of cases where the answers of the patient do not tally, and the presence of a sufficient amount of ***irregular*** astigmatism is probably the cause. A very small amount of irregular astigmatism, which is often present, does not interfere. This instrument registers as small an amount as 0·12 of astigmatism and even 5° of obliquity. As a time saver it is invaluable, and in giving confidence to the examiner when working out small errors, it is, to my mind, irreplaceable, and I shall be glad to hear if others can speak as highly of it, because, if so, I am sure that many of you will seek to possess this instrument if you do not do so now.

I think you will agree with me that all aids in refraction work, useful as they are in saving time and giving confidence, must be regarded as ***servants***, and the examination of the patient before the test types must have the ***last*** word, especially when the patient's accommodation is paralyzed.

I have not referred to the value of retinoscopy because I suppose we all agree and invariably employ it; but in estimating low errors it is not delicate enough, and this is where the ophthalmometer comes in.

Having ascertained the exact correction of the error the final point is how you are going to treat it: Do you insist upon a post-cycloplegic examination? Personally, I do, if I have not ascertained at the first examination what the patient will accept. It is no good giving a glass that causes ***worse*** vision than is obtained without a glass! If there is, say, 4 D. of hypermetropia in a child

and you, as a rule, take off 1 D. for the atropin, this may be too little, and to get as distinct vision as the child had before the atropin, it may be necessary to deduct 2 D. at first.

I trust you agree with me that at the post-cycloplegic examination no alteration should be made in the *cylinder*?

Do you agree that in myopia the full correction should be given, and no deduction made for near work in the young? Personally, I believe it to be the only reasonable treatment. By correcting the error fully we make the patient virtually normal and thus insist upon the ciliary muscle doing its proper work. I believe this treatment to be the best preventive of progressive myopia.

In very high myopia, in oldish patients, I do not believe in giving the full correction for constant use, as it is, as a rule, intolerable—but others may have had a different experience. In such cases the best treatment is to give glasses for general use about 3 D. weaker than the full correction, and to give this —3 in the form of a "spy glass" to be used in front of the glasses when wishing to see acutely at a distance.

I may mention that in ordering glasses for myopia, I have found the patient obtained great benefit from Crookes's "A" glass. This glass, of course, is specially beneficial in all refractions where the glare of light is felt.

With presbyopic patients who show astigmatism, do they tolerate the correction of it if it has never before been corrected? Personally, I consider they mostly do tolerate it, especially if given in the form of bifocals for constant use.

One word as to *bifocals*. Personally, I find that, if properly made, they are, in a large majority of patients, invaluable, but if they do not fit accurately they are worse than useless, and my experience is that few opticians are successful in making them. Another point to remember is, not to have the reading portion too strong. It will be interesting to learn from those of you who have experienced the work of provincial opticians, what the results have been.

Lastly, when do you order the glasses to be worn? Of course, theoretically, if you believe the error needs correcting, it should be corrected all the waking hours, and, I think, the majority of you will agree that in the case of children this should be insisted upon, except, of course, when playing games, such as football. Older patients, especially ladies, I find, emphatically decline to adopt this treatment unless they are convinced by firm and delicate arguments; but even the personality of the doctor sometimes fails here, and we have to be content with the use of glasses for near work only, allowing lorgnettes to be used for the theatre, etc.

In prescribing for presbyopia we should always ascertain the accommodative power of the individual and adapt our glass accordingly.

I suppose we all agree that a monocle should only be allowed if one eye is blind, or partially so.

As the discussion is limited to the errors of refraction, I do not propose to refer to heterophoria except to say that my experience has been, when the error was properly corrected, the heterophoria, if small in amount, tends to disappear.

And one last word as to treatment. I am certain that the refraction of the eye is constantly changing, that is, from year to year, even in older patients—and that a fresh examination should constantly be made. My experience is that in young patients the error tends to disappear if properly corrected. On the other hand, I have noticed that as life advances, astigmatism, previously absent, sometimes appears, or tends to increase. Perhaps you will tell us your experience on this head.

I feel sure also we should never do our work on a stereotyped plan—the personal element enters so largely into every medical case. Experience teaches us that what may be a perfect treatment for one, is useless for another. One thing I am sure of, and that is, that we have reached nearer an *exact science* in refraction work than in any other department of medicine, and that, if we do this work conscientiously and carefully, we are more likely to benefit the human race than by tons of physic!

Well, gentlemen, with my colleague, Col. Elliot, I have tried to indicate the various ways in which you can acquaint us with your experiences. There are many points which the exigencies of time do not allow me to enumerate, but which some of you will probably tackle; and I feel sure that our united knowledge and experience will certainly help those who come after us.

THREE MAGNET CASES WITH SOME UNUSUAL FEATURES

BY

IVOR LL. TUCKETT, M.D.Cantab.

THE following three cases were admitted to the Royal London Ophthalmic Hospital, while I was house-surgeon there in 1916-17, under the care respectively of Mr. E. Treacher Collins and Mr. P. Flemming. They have been kind enough to give me permission to record the following facts, which I think may be of some interest to ophthalmic surgeons.

Case 1.—F. S. was admitted on November 8, 1916, with the history that the same afternoon he was hitting a piece of steel with a hammer when something flew into his right eye. On admission,

it was noted that the margin of the lower lid was cut near its centre, and that there was a small wound of the lower part of the cornea, but that the anterior chamber was deep and full. There was also a large hole in the lower half of the iris corresponding to the corneal wound, and some lens opacity and exudate in the vitreous below. The Haab magnet was thoroughly tried both on November 8 and 9 with negative result. On November 10 a skiagram showed the presence of a large foreign body 20 mm. deep to centre of cornea, 7 mm. below and 11 mm. to temporal side. This showed that the foreign body was definitely outside the eye. On November 11 the Haab magnet was again applied by me as far back as possible on the temporal side of the globe rather below the horizontal plane. The foreign body came forward (presumably beneath Tenon's capsule) and after I had opened Tenon's capsule under a conjunctival flap I pulled out with the Haab a large piece of iron. When the patient was discharged on November 22 the state of the right eye was as follows: An anterior synechia to corneal scar below; the pupil well dilated; dense posterior cortical lens opacity; large mobile opacity in vitreous; no view of fundus; dull red reflex; tension normal; vision=fingers at two feet; projection good.

When he last attended as an out-patient on January 11, 1917, the right eye was quiet and the vision was only 1/60 owing to the posterior polar opacity, but some details of the fundus could be seen. I have written to him since but can get no reply.

Case 2.—A rather similar case was that of W. I., admitted under Mr. Collins on February 25, 1917. In this case a piece of steel entered the right eye at the corneo-scleral junction above, slightly cutting the margin of the upper lid; and, after passing through the globe, it was shown by a skiagram to be lying about 6 mm. behind the globe at the back of the orbit. Three attempts were made with the Mellinger magnet to move the foreign body, but without result. The vitreous was still full of blood when the patient was discharged on March 13, and vision was only perception of light. He returned again on March 24 with ciliary injection and a few spots of "keratitis punctata" in the right eye; so it was excised on March 26. On dividing the eye I found a definite hole of exit situated about 5 mm. on the temporal side of, and 2 mm. above, the optic disc. Viewed from inside the eye, the opening was filled by a curtain of organized inflammatory vitreous tucked into it like a handkerchief into a ring; while viewed from outside, the opening was covered by a piece of rusty iron adherent to the globe and embedded in a mass of organised blood-clot at this point. The curtain of inflammatory tissue inside the eye stretched forward to the lens which was still surrounded by blood-clot. The fact that I found the foreign body adherent to the back of the eye does not prove, I think, that the localisation with the X-rays was incorrect. It is quite possible that

the attempt to remove the foreign body with the magnet, brought it forward against the back of the globe where it got entangled in blood-clot. Unfortunately, another skiagram was not taken which might have shown this. However, there can be no doubt, I think, that another skiagram would have shown that the foreign body moved with the globe, seeing that, though it was outside the eye, it was adherent to the sclerotic at the back.

Both these cases illustrate the fact that a foreign body may sometimes strike an eye with sufficient force to pass through the globe and perforate the sclerotic at the back. And, while in most cases removal of the foreign body from the orbit is likely to be impossible, the first case shows that, rarely, a strong magnet may succeed in drawing a piece of iron forward under Tenon's capsule.

Case 3.—A.W.R. was admitted on February 20, 1917, under the care of Mr. Flemming. He gave the history that on January 17, 1917, he was screw-cutting a shell when something struck his left eye. He went to his panel doctor, who said he took something out of his eye, and he went back to work the same night. Fairly soon the sight of the left eye gradually began to go. On admission, the left eye was quiet; no injection, cornea clear except for a linear scar half-way between the centre and limbus on the nasal side. Corresponding to this, the uveal pigment at the margin of the pupil was a little deficient, and a lump of pigment was adherent to the lens capsule, but the pupil was fully active and there was no posterior synechia. The lens was only semi-opaque, so that inside it near the posterior pole at about "7.30 o'clock" could be seen a definite shining particle. Vision was equal to counting fingers at two feet.

On March 9, 1917, the Mellinger magnet was used and at once brought the foreign body forward, but it could not escape at first through the lens-capsule and it revolved round and round in the semi-fluid lens matter in response to the magnetised rod, giving exactly the impression that the lens itself was rotating, After about a minute it found the hole of entry in the capsule and escaped into the anterior chamber, whence it was extracted through a keratome incision at the limbus above. The eye healed up without any hindrance and the further progress of the case was as follows.—March 13, needling of left lens; March 16, curette evacuation; March 21, discharged with a perfectly quiet eye, pupil round and well dilated with atropin, fundus details well seen and normal, vision with $\frac{+12 \text{ D. Sph.}}{+1 \text{ D. Cyl. ax. hor.}} = 6/18$ and with + 4 D. Sph. added he read J.4. April 16, readmitted, thin filmy capsule partially blocking pupil; April 17, needling of capsule; April 20, discharged, vision with $\frac{+ 11{\cdot}5 \text{ D. Sph.}}{+ 2 \text{ D. Cyl. Ax. } 25° \text{ in}} = 6/9$ partly.

This case is interesting, I think, because it illustrates *first*, the

difficulty which a foreign body inside the lens may have in escaping through the capsule; *secondly*, the production in consequence of an apparent rotation of the lens; and *thirdly*, the rapidity with which sight may be restored after a traumatic cataract.

TRANSLATION

RECONSTITUTION OF THE LOWER CUL-DE-SAC BY CUTANEOUS AUTOPLASTY*

BY

MARCEL DANIS,
MÉDECIN-ADJOINT DE L'ARMÉE BELGE

PENETRATING wounds of the orbit by war projectiles often provoke extensive destruction of the conjunctiva. The eye bursts, empties itself more or less completely of its contents, and is, as it were, reduced to pulp. Enucleation of the remaining stump is rendered very difficult.

The conjunctiva, torn in many places, cicatrizes irregularly, while leading to contractions which often entail the almost total disappearance of the lower *cul-de-sac*. The introduction and the keeping in place of an artificial eye are then impossible.

In recent cases the introduction of a porcelain shell, pierced by a central hole which permits of the escape of the conjunctival secretions, guides the conjunctiva in its cicatrization, and makes the ultimate wearing of an artificial eye possible.

In long standing cases we have employed paraffin spheres of increasing size; the distension produced by them lengthens the cicatricial bands and enlarges the cavity. Under these circumstances it may be possible to introduce an appropriate prothesis. But in certain cases the retraction is such that the inferior *cul-de-sac* has completely disappeared. Progressive dilatation is inefficacious, and surgical means alone are likely to be of use. When the conjunctiva is absent it is necessary to employ a graft.

Different kinds of graft have been described, as, for example, the hetero-conjunctival graft with conjunctiva from the rabbit or the dog, the dermo-epidermic graft of Thiersch, the graft of buccal mucous membrane, the graft of vaginal mucous membrane, and the graft of frog's skin.

Several methods of cutaneous autoplasty are described in the *Encyclopédie française d'ophtalmologie:* the operations of Dieffenbach, Snellen, Harlan, Rogman, and Samelsohn.

* Translated from *Ann. d'Ocul.*, February, 1916.

The procedure which we have employed is a modification of Snellen's operation. The *technique* is as follows: The operation is done in two stages:

First Stage.

(1) An incision is made from the external angle of the eyelids having a length of about 1 centimetre.

(2) The cutting of a temporo-frontal flap, of which the length should be one-third longer than the distance of the external point of the canthotomy from the caruncle, and its breadth about $1\frac{1}{2}$ cm. to 2 cm. at the base. It ends in a rounded point. The flap begins 1.5 cm. to 2 cm. below the level of the line of the canthus and the internal incision passes to the external extremity of the canthoplasty.

(3) Dissection, haemostasis, and toilette of the flap.

(4) In consequence of the canthoplasty and the infero-external incision of the temporo-frontal flap, the lower eyelid may be drawn downwards. The conjunctiva of the inferior *cul-de-sac* is then incised and dissected along the two edges of the incision.

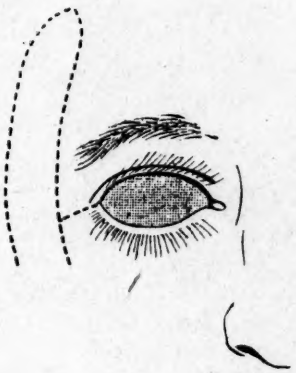


FIG. 1.

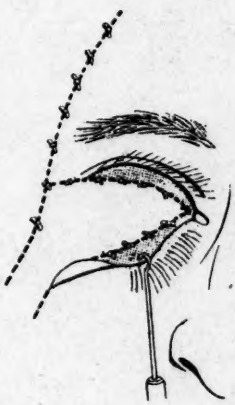


FIG. 2.

(5) The temporo-frontal flap is turned at about an angle of 90 degrees, and its summit is fixed near the caruncle, between the two lips of the dissected conjunctiva, and is fixed there by a point of suture.

(6) The cutaneous flap is sutured to the two conjunctival lips.

(7) The skin of the temple is sutured.

(8) The position of the new *cul-de-sac* is ensured by a loop of suture emerging at the level of the cheek.

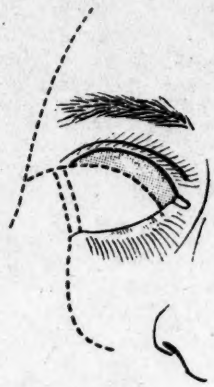


FIG. 3.

Second Stage.

The second stage of the operation is undertaken after complete cicatrization.

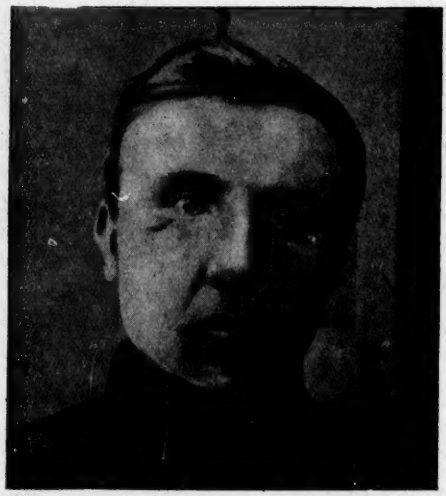


FIG. 4.

(1) Division of the pedicle of the temporo-frontal flap.

(2) One excises a rectangle of skin, the breadth of which is 3 to 4 mm.; one of the extremities of this rectangle corresponds to the external angle of the upper eyelid; the other to the external

angle of the retracted lower eyelid. It is in the gutter thus formed that one places the lower eyelid, freed by an incision, oblique below and inside, and slightly curvilinear at its lower extremity.

Sutures.—In order to avoid all retraction, before fixing the points of suture, we place a provisional prothesis in the orbital cavity.

The two advantages of the operation described over that of Snellen are the following:

1. Better nutrition of the flap, of which the base may be larger and which is not nipped or rendered anæmic by the button-hole which Snellen makes near the external angle.

2. The conjunctival and cutaneous suturing is rendered much easier by the liberation of the lower eyelid.

We have had occasion to employ the operation described upon two wounded soldiers in the Belgian ophthalmological service of No. 30 Complementary Hospital at Rennes.

First case.—D.———, infantryman. Penetrating wound of the eye by rifle bullet. The bullet must have entered through the cornea (there was no lesion of the skin of the eyelids) and emerged behind the ear. Enucleation the same day in a hospital at the front. We saw the patient 37 days after enucleation. The lower *cul-de-sac* could not be said to exist; the conjunctiva was retracted and cicatricial, and the introduction of an artificial eye was impossible. The operation, which I have described, made the wearing of a prothesis very easy (see Fig. 4).

Second case.—S. M., aviation mechanician, was wounded by a fragment of a bomb from an aeroplane. The eye was enucleated in a hospital at the front.

On arrival at Rennes we found.—A cicatricial band of the upper eyelid, 1 cm. from the internal angle, and ectropion of the outer part of the upper eyelid. The lower *cul-de-sac* was completely bridled by cicatricial bands, drawing the lower eyelid towards the depths of the orbit, the *cul-de-sac* being completely absent.

In order to correct the ectropion, freshening and suture of the upper eyelid, and operation according to the *technique* described above. After this operation the wearing of an artificial eye became quite easy.

S. S.

ANNOTATIONS

A Representative Council of British Ophthalmologists

A meeting of ophthalmic surgeons was held on May 2 last at the house of the Royal Society of Medicine, for the purpose of forming a representative council empowered to take action in matters of

ophthalmological interest in connection with public affairs. Mr. E.Treacher Collins, president of the Ophthalmological Society of the United Kingdom, was voted to the chair. The resolution that such a council (see these columns April, 1918, p. 230) be formed was proposed by Sir Anderson Critchett, Bt., C.V.O., who said it would meet a definite need, would tend to weld the elements of ophthalmology more closely together, and would make for the public welfare. Mr. F. Richardson Cross seconded the resolution, remarking that governments and governing bodies required expert advice in order to be efficient, and that the best experts were those who enjoyed the confidence of their colleagues. Owing to the amalgamation of the journals devoted to ophthalmology, and to the representation on the Ophthalmological Society of the various similar bodies in the kingdom, the profession was now well organized, and could present a powerful front on all questions which specially concerned it. As instances he mentioned ophthalmia neonatorum, Army and Navy visual standards, industrial lighting, enquiries concerning the blind, compensation payable according to degrees of visual disability, and so forth. Mr. J. B. Lawford, in supporting the resolution, said that the days were rapidly passing when we could afford to ignore scientific discoveries and the new methods based upon them, and he believed that in the future more attention would be paid to the views of representative bodies and less to the opinions of individuals, however eminent. The State was assuming more and more the rôle of parent, and, like other parents, would be the better for sound advice. He would like to see ophthalmology made a compulsory subject in the medical curriculum, a matter in which we were much behind other civilized countries. At present a man who obtained the minimal qualifying medical diploma could at once take up the practice of ophthalmology, and if the council did nothing beyond insisting that it was not taken up without special training, it would fully justify its formation. Speeches in support were made by Mr. J. Gray Clegg, Sir George Berry, and Mr. George Mackay, and the resolution was carried unanimously. The meeting further decided that the council should consist of all the past and present presidents of the Ophthalmological Society of the United Kingdom and of the Section of Ophthalmology of the Royal Society of Medicine (permanent members), of four members nominated annually by the councils of each of those societies, and of one representative, also elected annually, by the Oxford Ophthalmological Congress.

Medical Certificates

A circular dated March 12, 1918, dealing with medical certificates in connection with men who appear before National Service Medical

Boards, has been issued to members of the medical profession by the Minister of National Service. The memorandum has not appeared a day too soon. It points out that a properly drawn certificate may be of great assistance to a Board, and that such a document is sure to receive full consideration. A good certificate should state name, age, and address of patient; date of last personal examination; length of time the patient has been personally known to the certifier; what diseases the latter has attended him for; the patient's present physical condition; and the name, address, and qualifications of the certifier. Particular care should be taken to avoid any expression of opinion as to the man's fitness or unfitness for Military Service, which is a matter for the Board to form an opinion upon. Thus, it is one thing to certify that a man's sight is 1/10 normal, and quite another to state that he is thereby unfitted for Service. A good certificate confines itself to matters which have come under the practitioner's personal knowledge. If reference be made to other matters not within the certifier's cognizance that fact should be made plain. For example, a certificate of epilepsy may be given, although the practitioner has never seen the patient in or immediately after an epileptic fit. The statement, in fact, is based upon nothing stronger than the man's word that he is subject to convulsive seizures. To put the matter briefly, a medical man who is called upon to give a certificate should regard himself as an impartial witness and not as an advocate or a judge.

Eyelashes in the Anterior Chamber

The *Lancet* (January 19, 1918) comments on an article by Cantonnet in the *Progrès Médical* (date not given) referring to the presence of eyelashes in the anterior chamber as a war injury, and gives the details of diagnosis and surgical treatment. Apparently Cantonnet is referring to cases in which the lashes have found their way into the chamber as the result of an explosion of a projectile, but without a definite wound. "It is difficult to understand" says the *Lancet*, "how a body so supple, long, and light as an eyelash can be torn from the eyelid and driven through the cornea to the iris. If at the same time a lesion, such as traumatic cataract, is produced, indicating the entrance to the eye of a comparatively large body, it is easy to imagine that in its passage it may have detached an eyelash and carried this with it. But when there are only punctiform specks on the cornea, without proof of any penetration, it is difficult to understand how the lashes can have penetrated." We are not so sceptical as our contemporary seems to be, but all the same this is an interesting subject on which we do

not recollect to have seen any observations in British journals. We should welcome any communications on the penetration of eyelashes as a war injury.

Records of Visual Acuity

The Deputy Commissioner of the New York Department of Labour, part of whose work it is to determine the amount of compensation to be paid to claimants for losses in vision, writes to the *American Journal of Ophthalmology* pointing out that the scale he adopts is based upon such and such a percentage of loss. If figures reach him as 20/20 he takes it that the man has 100 per cent. of vision; if 20/40 that he has 50 per cent. of vision; and so on. He often receives reports from oculists, however, who do not work at a distance of twenty feet, and he then finds it most confusing to determine compensation on a percentage basis. He requests oculists in filling up the reports always to state specifically the percentage of loss of vision. In a note appended to the Deputy Commissioner's letter the Editor points out that the percentage scale has come into almost universal use in statistical studies. As applied to records of visual acuity it is easier to read and to print, and is indeed superior in all ways except that we are not accustomed to the method. "If the change made necessary the renumbering of our test-cards it would be an advantage, for they would be numbered more accurately."

Eye Risks in Industrial Occupations

In 1916, a survey of some seventy representative industries in the City of Buffalo was undertaken by the National Committee for the Prevention of Blindness (130, East Twenty-second Street, New York), and a book on "Eye Hazards in Industrial Occupations" has grown out of that inspection. An attempt has been made in the book to cover the entire field of risks to the eyes incurred in occupations in the United States, and a most interesting compilation is the result. The work bears the name as author of Gordon L. Berry, field secretary of the National Committee. Lieut. Thomas P. Bradshaw, U.S. Army, formerly technical assistant to the Director of the American Museum of Safety, has co-operated with Mr. Berry. In the Buffalo examinations professional assistance was given by Drs. Ellice M. Alger (New York), Nelson M. Black (Milwaukee), Colman W. Cutler (New York), Francis E. Fronczek (Buffalo), Harold Gifford (Omaha), Franklin C. Gram (Buffalo), and F. Park Lewis (Buffalo). The contents of the book are extremely

comprehensive, and among the other subjects dealt with we note accidents to the eye from intense heat and light radiations, and sections dealing with miners' nystagmus, poisoning by methyl alcohol (wood alcohol), and the lighting of shops and factories. As we hope, however, fully to review this timely publication in a later number of the Journal, we need in this place merely give readers some idea of the contents of a useful and meritorious production.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

Annual Congress, 1918.

THE Annual Congress of the Society was held on Thursday, Friday and Saturday, May 2nd to 4th, under the presidency of Mr. E. Treacher Collins, and can be voted, especially in view of the Imperial position, a decided success; the meetings were well attended, and there was no diminution in the keenness of the debates. Papers were read and discussed, and the business meeting was held at the rooms of the Royal Society of Medicine, as well as a clinical meeting. A visit was paid to the Metropolitan Asylums Board Ophthalmia Schools at Swanley, where the President, who is also the responsible Medical Officer of the institution, entertained members to luncheon, and where a discussion took place on "Contagious Diseases of the Conjunctiva." The concluding event was a very interesting clinical meeting at the National Hospital for the Paralysed, Queen Square. On Thursday evening members dined together, and during the three days an Ophthalmological Museum was open for inspection, while an afternoon was devoted to a visit to the Royal College of Surgeons of England, where Colonel Lister, C.M.G., exhibited a number of instructive specimens.

The President, in the course of his opening address, said that although the public activity of the Society was now restricted to three days' proceedings, its activities were far from being confined to that period, for there were constantly arising matters of ophthalmological interest needing vigilance and care. Since the Report of the Committee appointed last year to deal with the standards of vision for the Army had been published, the medical examination of recruits had been transferred from the War Office to the Ministry of National Service, and the standard had been altered. He congratulated Colonel J. H. Parsons on having been appointed to the

important and responsible post of Consulting Ophthalmic Surgeon to the Forces at Home. With regard to contagious ophthalmia, numbers of men had been transferred from countries in which this condition was rife, to other places where its occurrence was merely sporadic; and conversely, many men who were free from any suspicion of anything of the kind had been transferred to districts in which quite 90 per cent. of the populace were so affected. These trachoma-infected soldiers would, in course of time, return and reside with their uninfected kith and kin. Every effort should be made to obviate a repetition of the general infection of the civil population which occurred on the return of the troops from Egypt after the Napoleonic wars. He did not regard as at all satisfactory the position of affairs in regard to the blindness following ophthalmia neonatorum, the granting of licenses in regard to eyesight in occupations in which defective sight was injurious, the provision of special curricula in schools for short-sighted children, and the further care of the eyesight of children during the unnatural strain involved in school work. He criticized the condition of affairs which allows a medical graduate to practise ophthalmology as a specialty after three months' perfunctory attendance in the ophthalmological out-patient department of a general hospital, without necessarily having his knowledge on the subject tested at the end of that time. In this matter England would do well to follow the lead of Ireland, and he would like to see an extension of the system of granting a special diploma in the subject, as carried out at Oxford. He concluded with two announcements: that the Edward Nettleship Prize had been awarded to Lieut.-Colonel Gordon Holmes, for his work on disturbances of vision in association with cerebral lesions; and that the Bowman Lecture in 1919 would be given by Dr. Morax, of Paris.

Mr. Collins followed with a paper on "An Experimental Investigation as to some of the Effects of Hypotony in Rabbits' Eyes." His conclusions were that the exudate external to the choroid and on the inner surface of the retina came from the veins of those structures, owing to the alteration of the relation of the blood pressure to the intra-ocular pressure. Similarly, that the serous exudate in the anterior chamber probably came from the veins of the iris. Under normal conditions of intra-ocular tension the veins of the iris acted as excretory channels for the aqueous humour. When the tension became diminished, a serous exudation proceeded from them instead.

Lieut-Col. R. H. Elliot read a paper, supplemented by numerous slides, on the "Histology of the Trephined Disc." He entered fully into the technique, and expressed the view that for a trephining operation to be successful it seemed essential that a portion of Descemet's membrane should be removed, or of the pectinate

ligament, or both. The hyaline thickenings on Descemet's membrane were found close to where the membrane was about to break up to form the pectinate ligament, and he regarded them as the products of the activity of the endothelial layer of the membrane.

The President sketched the various methods and position of the incision in these cases, and showed that the sclero-corneal margin was the only promising site for the wound.

Captain Cruise did not consider it necessary to excise a circular piece of Decemet's membrane in order to get a permanent filtering scar. Mr. Horsford agreed with Captain Cruise.

Mr. George Thompson read an account of four cases of Herpes Zoster affecting the ciliary nerves. Mr. Mayou gave the subsequent history of his two cases which were mentioned in Mr. Thompson's paper, and the discussion was continued by Dr. G. Mackay and Colonel Lister.

Captain Cruise read a further note of the use of the visor, and demonstrated the new design, which he had evolved to meet the criticisms against the form he showed at the last Congress, and which was admittedly successful in meeting all the objections. He claimed for the mechanism not only simplicity, but that it was fool-proof. The mesh could be placed on to the top of the helmet out of the way or lowered into position in one second. A central projecting strut formed the fulcrum for the movements, there were no chains to rattle, and the mesh was held out beyond the possibility of friction on the nose. The visor did not diminish accuracy in shooting, and in bright sunshine wearing it was a definite advantage in shooting.

Colonel Lister considered the design a beautiful one, and thought the only likely inconvenience was when worn with a gas apparatus, which latter was of itself a sufficient disability, especially on a hot day. He could not understand the evident apathy in regard to the rapid issue of these visors to the Army. The other papers read at the morning session were: Captain W. Wallace, "The Dioptric Mean in the Myopic Soldier"; Mr. George Young, "Suggested Clinical Tests of the Threshold of Light and Colour"; Captain T. Henderson, "On Contracted Sockets."

The afternoon meeting was given up to a discussion on "Plastic Operations on the Eyelids," when Major H. D. Gillies demonstrated a number of cases from Sidcup Special Hospital, and gave an elaborate description, by means of the epidiascope, of the operations carried out to reduce the terrible disfigurement from which most of the soldiers shown had suffered. Cases showing the improvement of contracted socket and ectropion by means of epithelial inlays (Esser method) were also shown. He was awarded a special vote of thanks for his contribution. The discussion was participated in by Mr. Higgens, Captain Derwent Wood, Mr. Harrison Butler, Major Ormond, Mr.

Mayou, Captain Cruise, Colonel Newlands (Australian Medical Corps), Major Waldren (Canada), and Mr. Grey Clegg.

Mr. McMullen read the Report of the Committee on the conditions affecting the standards of vision in the British Army.

The Hon. Secretary (Mr. Mayou) read a communication which had been received on the same subject from Messrs. Traquair and Paterson. The subject was generally discussed and the Report was, by resolution, accepted.

In the discussion at Swanley, on Friday morning, after a visit to the different departments of the School, including a demonstration by Mr. Tyrrell of treatment with CO_2 snow, a combined paper by Major J. F. Cunningham and Captain J. Wharton was read by Colonel Lister. This showed that 19 per cent. of the Egyptians in France had active trachoma, and 9 per cent. of the Chinese. Infected cases had to be weeded out from the clean cases, and the authors had no knowledge of any instance in which the disease had spread from the troops to the civilian population, or even to our troops. The cases were improving under treatment, and the sickness hours in consequence of it were no more than in a clean company. No cases of definite trachomatous granulations or of acute conjunctivitis were embarked now from Egypt or China to France. The methods of segregation and treatment were given in detail. In the working out of the scheme great credit was due to the ophthalmologists for the thoroughness of their work, and the Labour Authorities in France had given cordial help.

The discussion was joined in by Colonel Lister, the President, Mr. Tyrrell, Mr. Mayou, Mr. Story, Lieut.-Col. R. H. Elliot, Major Derby (U.S.A.), and Mr. Giri.

On Friday evening a clinical meeting was held, when cases were shown by the President, Lieut.-Col. Elliot, Mr. W. Sinclair, Dr. Giri and Mr. Hepburn, while perimeters were shown or discussed by Captain A. C. Hudson and Lieut.-Col. Elliot.

At the concluding meeting, on Saturday morning, held at the National Hospital for the Paralysed, a series of unusual cases were exhibited and discussed.

A vote of thanks was accorded to Dr. Kinnier Wilson (Hon. Sec.) for the organisation of this meeting.

BOOK NOTICE

Glaucoma: A Text-book for the Student of Ophthalmology. By ROBERT HENRY ELLIOT, with 158 illustrations. London: H. K. Lewis & Co., 1918. Price, 21s.

Colonel Elliot's previous work has proved so valuable that a widespread interest in his new book is ensured beforehand: his many followers in the matter of sclero-corneal trephining will be eager to hear him on the whole subject of glaucoma. Outside the limits of clinical work he does not claim to speak as an original investigator, but adopts the attitude of an earnest student who, on carefully studying the vast literature of glaucoma, has realised "how chaotic are many of the prevailing views." For three years, he tells us, he has striven to "unravel the tangle"—to winnow the chaff from the wheat, giving everyone a fair hearing, giving credit where it is due, rejecting what seems unworthy of credence, be the authority what it may, and thus, while helping himself to a clearer comprehension of the subject, to be of use to others. The result is an important volume of 540 pages which deals in a comprehensive way with a mass of material gathered, with ample acknowledgment, from many sources. Only an outline of the contents, together with a few comments on salient points, can be given here.

Chapter I is preliminary. The subject is defined. The term *glaucoma* is "a convenient clinical label for a large group of pathologic conditions, the distinctive feature common to all of which is a rise in the intra-ocular pressure." "To this rise all causes of glaucoma lead up: on it every sign and symptom depends." *Primary* and *secondary* forms are distinguished in the usual way. The terms *simble* (non-congestive) and *congestive* are adopted: the term *inflammatory* is condemned. The designations *acute*, *sub-acute*, and *chronic*, have caused confusion through being used in different ways; they apply properly to different stages of the same condition and not to different clinical entities. A short account of the anatomy of "the parts concerned in glaucoma" follows: then a brief history of the subject.

Chapter II deals first with certain terms in frequent use. The difference between *pressure* and *tension* is pointed out. The words *elastic*, *rigid*, *closed*, are defined, and the fact that the eyeball is not strictly speaking a closed sphere and has not a rigid envelope is elaborated. The existence of "filtering" as distinguished from "fistulous" scars is questioned. We admire precision, but does not the author fall a little below his own high standard when he says that what the finger or the tonometer tells us is the *tension of*

the tunic rather than the *intra-ocular pressure?* Really it is neither the one nor the other, but just the *impressibility* of the eyeball, which is a resultant of these two factors and some others. But the use of the word *tension* in this connection, though not strictly correct, is far too convenient to be dropped.

The flow of fluid through the chambers, pressure-changes in some forms of glaucoma, and the production of the intra-ocular fluid, are next discussed. Lastly, we have the important subject of the relation of chamber-pressure to systemic and to intra-ocular blood-pressure respectively. All will accept the conclusions that a change in systemic blood-pressure is not necessarily associated with a similar change of chamber pressure; that the high blood-pressure of arterio-sclerosis is not usually associated with high chamber pressure; and that osmotic action plays a large part in the transference of fluid from the anterior chamber into Schlemm's canal and the iris veins. That this osmotic action is "strongly reinforced" during the waking hours by the "pump-action" described by Professor Arthur Thomson is, we think, a less safe conclusion.

Chapter III is concerned with the aetiology of glaucoma. A sound plea is made for distinguishing between the tissue-changes which are *causative of* and those which are *consequent upon* the morbid process. Further we read that "there is a widely existent confusion between the aetiology, the pathogeny, and the pathological anatomy of the disease," and that this is "fatal to clear thinking." We will not dispute it, but has our author noticed that on almost the next page he invites us to study pathological anatomy under the general heading, "Aetiology," and that under the sub-heading, "Pathological Anatomy," he tells us about the normal growth of the lens? The truth is that matters of this kind cannot always be sorted out and grouped in a rigidly logical way; indeed we will venture the criticism that our author, in his desire to be strictly systematic, has disarticulated and parcelled out his subject rather more than is really helpful. But this is mere by-play; let us keep to the essentials. In this chapter are discussed the many factors that take part, or are supposed to take part, in the glaucoma-process—changes in the vessels, cavernous atrophy of optic nerve, fibrosis of pectinate ligament, hydrophyllism; closure of filtration-angle, shallowing of anterior chamber, dimensions of eye, continuous growth of lens; age, sex, heredity, refractive errors, mydriasis, nerve-shock, febrile diseases, injuries. Here, as elsewhere throughout the book, evidence is carefully weighed, and dogmatism is avoided. Some questions, of course, are prudently left open.

On one important and much disputed point Elliot speaks positively: "There is no essential difference between the most

chronic form of simple glaucoma and the most violent type of the congestive," (p. 383). "If the pressure rises slowly the circulation can adapt itself . . . and the glaucoma remains simple. If the increase of pressure is a rapid one, no such adaptation is possible, and an attack of congestive glaucoma is the result" (p. 6). "Simple glaucoma frequently passes into the congestive form" (p. 381). "Very few cases, if any, are absolutely innocent of a congestive element throughout their course" (p. 244). We feel less sure of this essential identity than formerly. The ultimate congestive stage of a simple glaucoma is different anatomically from an initial congestive attack, and although certain predisposing conditions are common to both types of the disease, we think an essential difference in causation may yet be established. Heerfordt's discrimination between a lymphostatic and a haemostatic condition has perhaps received less attention than it deserves.

Chapter IV is entitled The Diagnosis of Glaucoma, and consists of six parts. The most valuable, perhaps, are the two which deal with glaucoma-defects in the visual field. Methods of perimetry, varieties of defect, and anatomical reasons for the latter are ably discussed with the help of original diagrams. ***Bjerrum's sign***, though appreciated late in this country, is now of course well known. ***Roenne's step*** attracted general notice later still. "It is very frequently present" says Elliot, and only overlooked because "many surgeons are in the habit of moving their test-object along a few only of the radial diameters." To find it he advises first a careful examination of the radial meridians above and below the horizontal one, and then a movement of the test-object in successive concentric arcs across this line. The reviewer has long urged, and does so still, that for the glaucoma-field the circular method is preferable to the radial and usually renders the latter superfluous; to those who use it the "step" has long been a familiar finding and a "characteristic concentric contraction" of the field is unknown.

Seidel's sign—a small extension of the blind-spot upwards, downwards, or both ways, following the course of the nerve-bundles, is a matter of great interest if, as asserted, it is frequently ***the first discoverable defect*** in the field. One would not expect that when an isolated fibre-bundle is damaged at the disc the loss of function would be equal and simultaneous over the whole of the arcuate or comet-like area which it serves; the question is whether the head or the tail of the comet is usually the first to show itself. Elliot says it is the head; in other words that scotomata caused in this way usually ***begin*** at the upper or lower margin of the blind spot and spread later to the periphery. He gives two illustrative charts, which, however, as he points out, are not entirely in line with

Seidel's. The point is of great diagnostic interest. We hope he will give us further findings. This chapter concludes with a section on Tonometry and on the Examination of the Light-sense. The author describes and figures a lantern he has devised for the latter purpose.

Chapter V describes many forms of secondary glaucoma, and discusses possibilities of treatment in connection with each.

Chapter VI treats of congenital glaucoma and some allied conditions—buphthalmos, juvenile glaucoma, megalocornea. Causes, essential changes, complications, and possible modes of treatment, are considered. "The writer believes that there is no surer, and at the same time safer, method in buphthalmos than the use of the trephine."

Chapter VII discusses in an instructive way the measures other than operative, which are useful in combating the disease. Stress is laid on the regulation of the patient's mode of life. The opinion expressed on the advantages and disadvantages of continuous treatment by miotics will be generally accepted. Massage is commended more highly than we should have expected. Its value "in the treatment of glaucoma, altogether apart from any operative interference, has been greatly under-estimated in the past by the medical profession. The tension of an eye can be quickly, painlessly, harmlessly, and repeatedly reduced, by this means without the intervention of the surgeon; for the patient can learn," etc. Is it quite safe for glaucomatous eyes in general? When a bundle of nerve-fibres at the disc is already stretched and compressed nearly to its limit of functional endurance, may not a little added pressure, however brief and skillfully applied, occasionally act like the last straw on the camel's back? We have used massage almost habitually after lowering the tension by operation, but have been chary of it in unoperated glaucoma for fear of doing harm—perhaps without sufficient reason.

In the last three chapters we read of the operative treatment of glaucoma, and first of the work and writings of the "Old Masters," especially of von Graefe and his ardent follower, de Wecker. To the latter belongs the credit of insisting on the importance of a filtering cicatrix, and of expressly attempting to obtain it. But in simple glaucoma, just where it was most needed, it was obtained only in a minority of cases. Statistics are given to show that in "the iridectomy period" the treatment of simple glaucoma was unsatisfactory. Of the successes obtained in early congestive cases not very much is said. Remembering what iridectomy has done for acute glaucoma during the last sixty years, and that four years ago (International Medical Congress) a large majority of British ophthalmic surgeons were still employing it in preference

to any substitute, we think that "the case for iridectomy" is somewhat stronger than the author makes it. Then follows an interesting account of the introduction of "the newer operations"—partly quotation from the well-known article by Ballantyne. Lastly, after descriptions of other forms of sclerectomy, we have a lucid account of sclero-corneal trephining, with all the details relating to it. Colonel Elliot's work in this field is known to all.

We have commented on the book chiefly as a critic and a questioner, but that is far from being our whole attitude towards it. It is a work of high value. It represents not only a wealth of clinical experience, but a vast amount of thought and reading. In its pages, and by means of its many references, one can survey the whole subject of glaucoma more thoroughly than has been possible for many years without great labour. Every earnest student of ophthalmology should be grateful to its author.

PRIESTLEY SMITH.

CORRESPONDENCE

ATROPIN IN CATARACT EXTRACTION

To the Editor of THE BRITISH JOURNAL OF OPHTHALMOLOGY

SIR,—With reference to Mr. Fisher's suggestion that atropin should be instilled into the conjunctival sac previous to cataract extraction, I desire to inform you that it was the practice at the Egyptian Ophthalmic Hospitals for many years, and until recently, to instil atropin into the conjunctival sac of patients on whom extraction with iridectomy had been performed, immediately the operation had been completed and previous to covering the operated on eye. Whether atropin is instilled previous to the section or immediately after the iris toilet obviously makes no difference. This procedure was stopped a year or two ago because it was found that it rendered the liability to adhesion of the periphery of the pillars of the iris to the wound more frequent. The number of extractions of senile cataract performed at these hospitals last year was 477.

It is of interest to note that atropin irritation is practically unknown among Egyptian patients. When it occurs the old dodge of oiling the skin of the eyelids previous to the instillation of the mydriatic will usually prevent this annoying symptom.

Yours, etc.,

A. MACCALLAN.

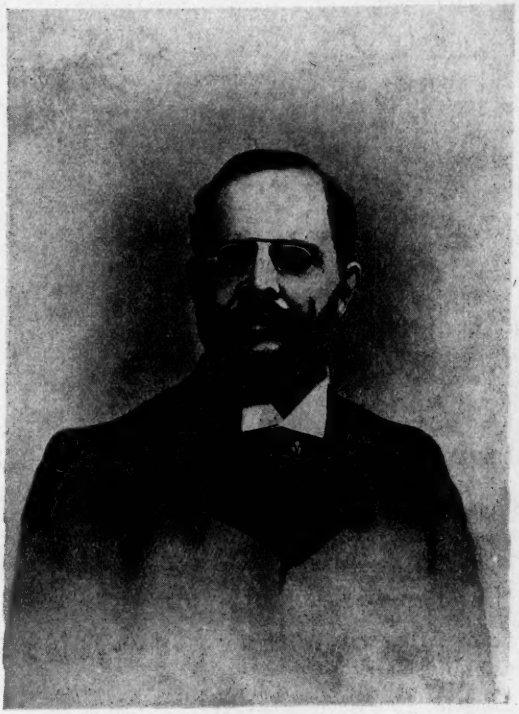
CAIRO,
February 12, 1918.

OBITUARY

In reference to the sudden death of Dr. D. Sulzer, of Paris, already announced in the March number of this Journal (p. 191), Dr. Victor Morax has been good enough to send the following: Sulzer used jokingly to say that his reason for returning to Paris after his prolonged stay in Java was partly his desire to follow the teachings of Charcot at the Salpétrière and partly the wish to see that triumph of engineering skill, the Eiffel Tower. Some of the truth conveyed by this paradox agrees with our friend's cast of mind, always alive to new ideas and interested by all that touched mathematics and the engineer's art.

I made Sulzer's acquaintance at the Salpétrière neurological clinique, at a time when after the patient preliminary anatomico-clinical studies of Vulpian, Charcot, and their pupils nervous syndromes had begun to shape, and when the methods of analysis of the nervous system had acquired their great precision. Examination of the visual apparatus, an indispensable complement to all neurological examination, was confided to Dr. Parinaud, whose works on ocular neurology were widely known. Charcot's Tuesday lectures were then followed by a large number of medical men. Sulzer there found a new environment such as he had never been able to secure in Zurich, where he had spent the first years of his medical studies, or in Strassburg, or in Utrecht. I have preserved the liveliest memory of the marked impression made by my first conversations with Sulzer. He compelled one's sympathy by his need of fathoming every problem with no other aim than that of the satisfaction of a scientific curiosity. He imported into the study and the discussion an animation that agreed well with the youthful appearance of his face. In him was found the energy of the old Swiss, thanks to which he could bend his body and his spirit to all kinds of training. Is it not a proof of unusual energy to take up

after more than six years' of colonial work, scientific researches in the ophthalmological laboratory of the Sorbonne in Paris; to settle as *privat docent* in Geneva; to return as ophthalmologist to Paris, despite the obligation again to pass all the medical examinations at the age of forty years; and, finally, when 56 years of age, to contract a voluntary engagement with the French Army, and to



undertake to the limit of his powers a laborious duty, not connected in any way with the high scientific culture with which he was endowed ?

The list of Sulzer's scientific publications is long. Many of them appeared in the *Annales d'Oculistique*, which he edited from 1892 until his death. But in order to appreciate the part he played in the scientific evolution of ophthalmology it is needful to notice his communications to various French and foreign ophthalmological societies upon focal ametropia, astigmatism, and upon the functions

of the retina which he wrote for the French Encyclopaedia of Ophthalmology. Among his other researches I must mention those dealing with his work upon the form of the human cornea and its influence upon sight, which was among the most important he ever accomplished. Although he dealt largely with questions of physiological optics, yet he by no means neglected other domains of ophthalmology, as witness his contributions upon cataract, glaucoma, the ocular complications of herpes zoster ophthalmicus, etc. Sulzer sought no titles or decorations, and renounced his independence only in order to devote his services to his adopted country, France.

NOTES

Appointments

Mr. J. GRAY CLEGG has been appointed ophthalmic surgeon to the Royal Manchester Infirmary, *vice* Major A. Hill Griffith, retired.

MR. T. Harrison Butler, a member of the Editorial Committee of this Journal, has been appointed visiting consulting ophthalmic surgeon to the Hospital of St. Cross, Rugby. The Hospital in question has appointed a complete consulting staff in the various special departments, the members of which are expected to advise upon difficult cases, for which purpose they attend the hospital about once a month.

Mr. G. F. C. Wallis has been appointed ophthalmic surgeon to the Kent and Canterbury Hospital.

Dr. Vogt, of Aarau, has been nominated as successor to the late Professor Mellinger in Basle.

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Council of the Royal College of Surgeons

AMONG the names of candidates for seats on the Council of the Royal College of Surgeons of England, we observe that of one ophthalmic surgeon, Mr. Harold Barr Grimsdale, whose Fellowship dates from 1894.

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The Medical Service of the Air Force

THE medical affairs of the Air Force are to be under the control of an administrative committee, composed as follows: The Director-General, Naval Medical Service; The Director-General, Army Medical Service; Surgeon-General R. C. Munday, Medical Administrator of the Air Force; Lieut.-Col. C. B. Heald, Assistant Medical Administrator; Dr. Henry Head, F.R.S.; Surgeon-General H. D. Rolleston; Captain Raymond Johnson; Dr. Leonard Hill, F.R.S.; and Sir Walter Fletcher, F.R.S.

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Ophthalmological Society of New South Wales

AT a meeting of the Ophthalmological Society of New South Wales, held on November 7, 1917, the following motion was carried unanimously: "That the members be asked to make a note of and record any case in which they can prove that an optician has exceeded the limit of his calling to the detriment of a patient."

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British Journal of Ophthalmology

As some subscribers may not have received the note of the Directors asking them to contribute an extra 10/6 towards the cost of the Journal for the current year, we think it desirable to repeat in brief the reasons that have led to this request. The price of the Journal was originally fixed at a rate which it was anticipated would rather more than cover all working costs. Unfortunately, owing to the rise in wages, and in the price of paper, the cost of production has increased by 85% since May, 1917. In these circumstances it was decided that it was in the best interests of subscribers to ask them to come to the aid of the Journal by a voluntary addition to their subscription for the year, rather than to reduce the size of the Journal below 48 pages. Many subscribers have already generously acceded to this request. Any who have not yet received the note, or have overlooked it, are asked to send the sum of 10/6 to the Manager, 24, Thayer Street, London, W. 1.

FUTURE ARRANGEMENTS

	1918	
Midland Ophthalmological Society	June 4	Wolverhampton
Section of Ophthalmology, Royal Society of Medicine	June 12	London
American Ophthalmological Society	July 9-10	Eastern Point, New London, Conn.
Oxford Ophthalmological Congress	July 10-12	Oxford.